

Health Consultation

EXPOSURE INVESTIGATION

SILVER BOW CREEK/BUTTE AREA
(a/k/a WALKERVILLE)

SILVER BOW CREEK, SILVER BOW COUNTY, MONTANA

EPA FACILITY ID: MTD980502777

JULY 18, 2001

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

Agency for Toxic Substances and Disease Registry

Division of Health Assessment and Consultation

Atlanta, Georgia 30333

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Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Agency for Toxic Substances
and Disease Registry
Atlanta GA 30333

July 27, 2001

Ms. Sara Sparks
U.S. Environmental Protection Agency, Region VIII
BSB Courthouse
155 West Granite Street
Butte, MT 59701

Dear Ms. Sparks:

Enclosed please find a copy of the health consultation for Silver Bow Creek/Butte Area (a/k/a Walkerville), Silver Bow Creek, Silver Bow County, Montana, dated July 18, 2001. The Agency for Toxic Substances and Disease Registry was contacted by the Butte-Silver Bow County Health Department and the Montana Department of Public Health and Human Services following the Environmental Protection Agency testing, to address community and health department concerns regarding ongoing exposure to lead and arsenic among these residents.

Please address correspondence to the Chief, Program Evaluation, Records, and Information Services Branch, Division of Health Assessment and Consultation, Agency for Toxic Substances and Disease Registry, ATTN: Silver Bow Creek/Butte Area (a/k/a Walkerville), 1600 Clifton Road, NE (E56), Atlanta, Georgia 30333.

If there are any questions, please direct them to Rubina Imtiaz, health assessor, at (404) 498-0499.

Sincerely yours,

Virginia Lee
for Max M. Howie, Jr.
Chief, Program Evaluation, Records,
and Information Services Branch
Division of Health Assessment
and Consultation

Enclosure

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HEALTH CONSULTATION

EXPOSURE INVESTIGATION

SILVER BOW CREEK/BUTTE AREA
(a/k/a WALKERVILLE)

SILVER BOW CREEK, SILVER BOW COUNTY, MONTANA

EPA FACILITY ID: MTD980502777

Prepared by:

Exposure Investigation and Consultation Branch
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

Objectives of Exposure Investigation

In the fall of 2000 EPA conducted indoor dust sampling for houses in Walkerville, Montana, which showed elevated lead and arsenic levels. In some areas, indoor dust lead levels exceeded 4000 mg/kg. The Agency for Toxic Substances and Disease Registry (ATSDR) was contacted by the Butte-Silver Bow County Health Department (BSBC) and the Montana Department of Public Health and Human Services (DPHHS) following the EPA testing, to address community and health department concerns regarding ongoing exposure to lead and arsenic among these residents. Subsequently, ATSDR conducted an exposure investigation (EI) comprising blood lead and urine arsenic testing of selected individuals who were living at residences with the highest measured indoor dust lead and arsenic levels, to evaluate ongoing excess lead and arsenic exposure among residents.

Background

Historically Butte has been an important mining, milling and smelting district. Gold was first discovered near Butte in 1864. By 1884 there were over 300 operating copper and silver mines, nine silver mills and eight smelters (Glick, 1985). Large scale underground mining operations diminished as surface mining began in 1955. One of the world's largest open pit copper mines was created at this time. Today, environmental impacts from both historical and modern mining operations remain. The city of Butte and surrounding areas were added to the Silver Bow Creek NPL site in July 1986.

Walkerville, is located in the southwestern part of Montana, in Butte-Silver Bow County. This small town, and part of Butte city, constitute the Butte Priority Soils Operable Unit (BPSOU). This area is primarily residential and is located within the upper Silver Bow Creek drainage of the Summit Valley. The Butte area encompasses approximately 85 square miles and lies west of the continental divide. The estimated population for Butte in 1990 was 33,336 (U.S. Census Bureau 1980). The population has experienced a general decline since 1920 when it peaked at 60,313 (Dodge 1976). Walkerville has some of the oldest homes in the Butte area, many built prior to World War I. Some of these homes were poorly maintained and many are thought to contain lead-based paint and lead pipe (The Butte Silver Bow Environmental health Lead Study; June 1991:BSBC, Univ. Cincinnati).

Several railroad lines run through the BPSOU; these lines are maintained by workers during the summer months. The beds of these railroad lines were, in many cases, built with mine waste. Exposure to contaminated soils and fugitive dust could occur during railroad maintenance. These may be source areas for residential contamination (EPA baseline RA for As, April 1997).

In the 1991 Butte Silver Bow study, screening for lead-based paint revealed a high percentage of homes with one or more interior or exterior surfaces in excess of the CDC's definition of moderate to high levels of lead in paint. The same study showed that neighborhoods with older housing (including Walkerville) had the highest levels of lead-based paint. They also showed that lead in interior household dust had the single strongest correlation with blood lead. It also estimated that approximately 40% of the lead source was from household paint while the remainder 60% was from external dust sources (past mining, milling, tailings, etc.).

This EI was performed in collaboration with BSBC. ATSDR arranged for the collection and testing of urine arsenic samples while the blood lead samples were drawn and tested by BSBC through their Childhood Lead Surveillance Program. While developing the EI protocol ATSDR staff communicated frequently with community representatives and BSBC and DPHHS staff through community meetings, conference calls and in-person meetings. The final planning meeting took place between the ATSDR, EPA-Region VIII, BSBC staff and the Mayor of Walkerville, in the Butte EPA office on April 16, 2001.

Methods

Target population

The target population for the investigation was selected from a census of residents of houses with the highest indoor dust lead and arsenic levels, provided to ATSDR by EPA Region VIII staff. The final population consisted primarily of children aged less than 6 years living at these properties. Children were targeted because they are generally assumed to be at increased risk of exposure to chemicals in soil due to their high soil contact and tendency to ingest soil either intentionally or through normal crawling and "mouthing" behavior. In addition, lead exposures in young children have been shown to adversely affect their neurologic and intellectual development. Based on interests and concerns expressed by the community, and available resources, the investigation also included a number of other residents who lived in residences that did not show very high levels of contaminants but were from the same neighborhood (Walkerville) and asked to be tested.

Adults from residences with the highest contaminant levels were initially contacted by a letter from ATSDR informing them of the EI and asking if they wished their children to participate. Individuals in which it would be difficult to obtain a urine sample such as very young children (less than two years of age) were not considered eligible for urine testing. The letter was followed up by a phone call by ATSDR staff, in which study participants were encouraged to participate and given specific instructions to not eat fish, shellfish, or other seafood for a day prior to testing. BSBC staff also encouraged local participation in the EI during community meetings. In a further attempt to increase participation by the target population, in-person, house to house contact was made with all targeted households on 17 April by ATSDR staff and sampling equipment and instructions were left with available residents. In addition, ATSDR Community Involvement Branch (CIB) and Public Affairs staff prepared and released a press announcement regarding the EI activities a week before the EI.

Biological Sampling

On April 17, 2001, ATSDR staff hand-delivered urine containers, collection instructions and exposure questionnaires, to available residents of the 28 houses visited. Participants were asked to report to the Blaine School in Walkerville on April 18 and 19, 2001, to turn in their urine samples and questionnaires and to have their blood drawn for lead levels. The EI staff were available at Blaine school in Walkerville On Wednesday, 4/18, from 3:00 PM to 7:00 PM and Thursday, 4/19, from 7:00 AM to 11:00 AM. Two late delivered urine samples were collected and shipped to the laboratory by BSBC staff on Friday, 4/20. At the visit, testing procedures were again explained to each participant. Following completion of the consent forms, a blood sample was drawn by BSBC staff according to the State laboratory protocol.

Data Analysis

The urine samples were sent to the contract laboratory, Pacific Toxicology Laboratories. On Wednesday, 4/18, fourteen urine samples for arsenic analysis and 25 blood samples for lead analysis were collected. On Thursday, 4/19, another 11 urine samples and 15 blood samples were collected. Two more urine samples were brought in on April 20 and shipped to the contract laboratory by the BSBC staff. One resident brought a urine specimen collected in a pediatric bag for her infant grandson, however this particular sample could not be analyzed by the laboratory. This sample was not part of the EI but was accepted at the community member's request.

The collected urine samples were logged and given ID numbers responding to the household ID and sent by express mail to the laboratory for total inorganic (or speciated) arsenic which includes inorganic species (As(III) and As(V)), and the metabolites methylarsonic acid (MMA), and dimethylarsinic acid (DMA). The laboratory detection limit for total speciated arsenic (uncorrected for creatinine) in the urine is approximately 10 µg/L. Urine was also tested for specific gravity and creatinine to evaluate urine concentration and determine creatinine-adjusted arsenic concentrations. The reference standard cited by the contract laboratory for total arsenic in unexposed populations is less than 20 µg/L. The ACGIH proposed Biological Exposure Index (BEI) is 50 µg arsenic/G creatinine when measured as the summation of inorganic arsenic and its methylated metabolites. This reference range was used as comparison value.

Whole blood samples collected by BSBC trained phlebotomists were logged and shipped to the DPHHS laboratory and results (Total Blood Lead level) were sent to ATSDR by BSBC staff.

Consent/Assent Form

Each adult participant signed an informed consent form prior to participation (Attachment A). For participants less than 19 years of age, a parent or legal guardian signed the consent form (assent forms were read to child participants 7 years of age or older).

Reporting of Results

ATSDR mailed individual test results to the participants on May 16, 2001 with an explanation of their significance. Both urine arsenic and blood lead levels, were reported in the same mailing.

Results

Household selection and participation rates: Forty-nine houses were originally selected based on the EPA environmental lead and arsenic data. Once the census for these houses was provided by EPA, the residential sample was narrowed down to 28 houses that had high contaminant levels *and* had resident children *or* regularly visiting grandchildren. The range of indoor dust (in "living area") lead levels in these 28 houses was 1130 ppm to 4640 ppm (mean=1148 ppm, median=773 ppm). All values for indoor dust arsenic in the "living space" vacuum samples were below 132 ppm; range=131 ppm to 3 ppm, mean=17 ppm.

Study participation letters were mailed to all of the 28 selected households on April 3. The same 28 households were visited by ATSDR staff on April 17 at which time one house was found to be vacant. At that visit, 30 urine sample collection kits and questionnaires were given to residents of 20/27 (74%) houses that were available. Over the next two days, 26/30 (87%) urine samples and questionnaires were turned in. An additional two urine containers were requested and handed out on April 19 and the urine samples returned the next day. Therefore, a total of 25/32 (78%) urine samples were returned for analysis. An additional urine sample was brought in for an 18 month old boy but could not be analyzed by the laboratory. On April 18 and 19, a total of 40 individuals had their blood drawn for lead levels. Of these, 23 samples were taken from the EI target houses and these 23 results only will be further described here.

Demographics: All participants were non-Hispanic white. Age and sex breakdown is given in the lead and arsenic results Tables 1 and 2.

Blood lead levels (BLLs): All 23 BLLs were below the level of health concern (10 µg/dL); range=<1 to 5 µg/dL. Of the 23 EI-related BLLs, 14 (61%) were less than 1 µg/dL (detection limit). Age and sex distribution is given in Table 1. Nineteen participants had *both* blood and urine tested, while four people had only BLLs and six people had only urine tested (3 of these 6 had recently been tested for BLLs, reported results below 10 µg/dL and did not want to be retested).

Urine arsenic levels: All 25 urine arsenic levels were below the detection limit of 10 µg/L which is well below the level of health concern of 20 µg/L or 50 µg arsenic/G creatinine. Age and sex distribution is given in Table 2.

Questionnaires: Of the 30 questionnaires that were handed out, 26 (87%) were completed and returned. Only 2/26 respondents reported eating rice or seafood in the 3 days prior to giving urine for arsenic testing. Only 1 respondent reported "eating dirt" (18 month old). This child's BLL was 1 µg/dL and urine could not be tested for arsenic. Six of ten children admitted to "playing in the dirt"

Discussion

Although community health concerns were high in Walkerville, based on the past experience with community meeting attendance, EI participation rates were expected to be low. Aggressive measures were taken to recruit the target population through mailings, phone calls and house visits. This resulted in a better than expected participation rate of over seventy percent of targeted households, and all of the children (10 of 10).

The levels of all tested contaminants (lead and arsenic) were well below the established levels of health concern in this investigation. In spite of high environmental levels for indoor lead there were no elevated BLLs in the EI. The EI was conducted in the winter since the likely exposure source was indoor dust, and BLLs were expected to be higher in the winter when children are confined inside their homes unlike the usual pattern of higher BLLs seen in the summer months. Ongoing health education and prevention activities in the community through BSBC and the resulting high community awareness probably caused the lower than expected results. Also, the EI gives a “snapshot” of exposure in that it only reflects the levels of contaminants around the time of testing but does not indicate past levels nor predict future exposures. However, at least one child was reported to “eat dirt” and many children reported playing in the dirt, therefore continued preventive efforts and community education is necessary specially during remediation to keep exposure potential low. Also, the surveillance of younger childrens’ BLLs needs to continue according to CDC guidelines.

Arsenic exposure does not appear to be a problem at this time however, since the environmental arsenic levels were highest in the attics, homeowners should be kept aware of the potential for exposure while remodeling or working in the attics.

Conclusion

- The exposure investigation had good community participation. All blood lead levels and urine arsenic levels were well below the levels of health concern.

Recommendations

- Community education should continue to prevent future exposures in view of the documented high environmental levels of lead in indoor dust.
- Home owners should be aware of the potential for arsenic exposure from the attic dust during remodeling, cleaning or conducting other activities in the attics.
- BSBC and DPHHS should continue to conduct BLL surveillance by actively targeting younger children in the community. Aggressive efforts need to be made to maximize target population participation in the testing.



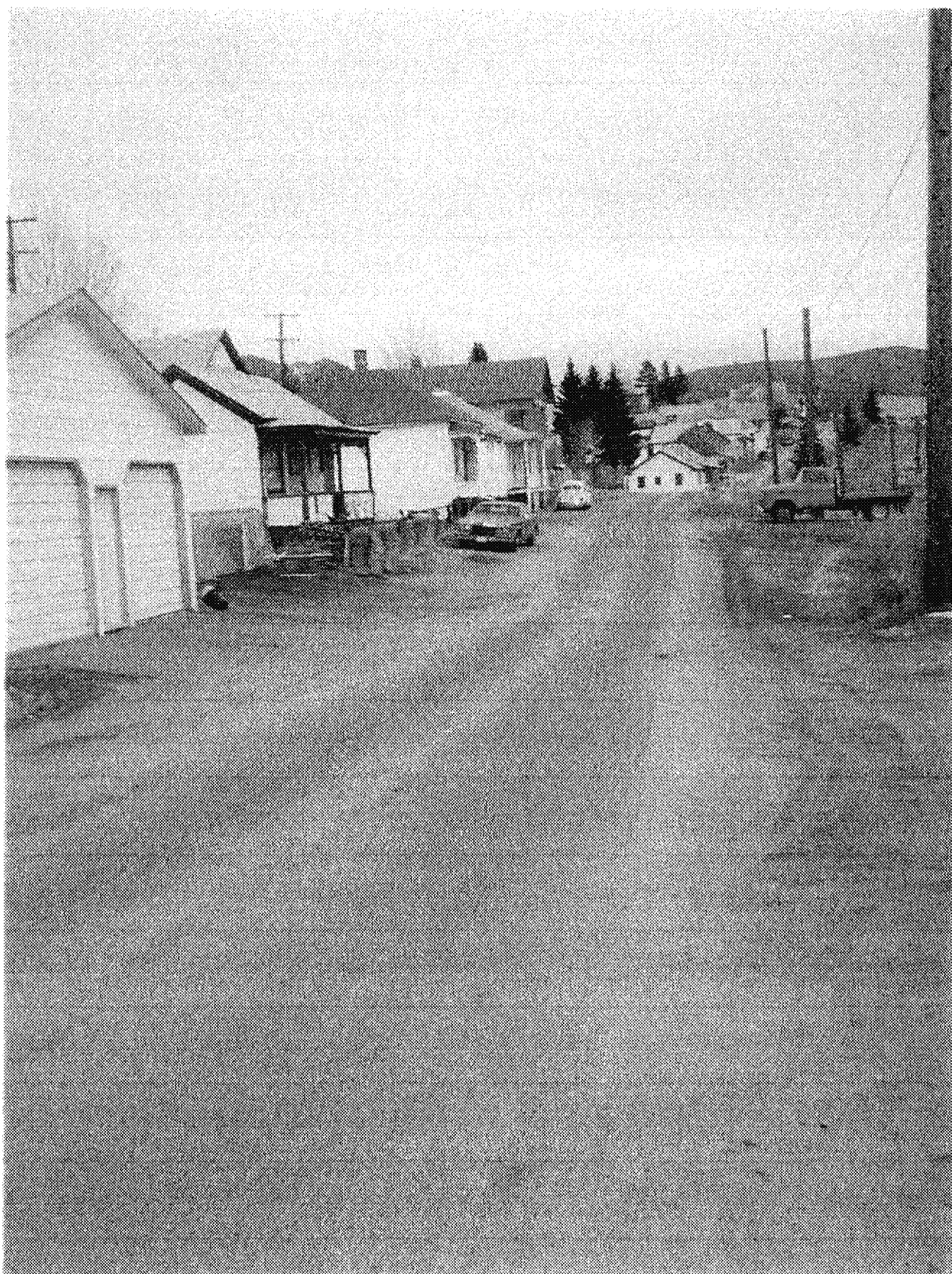


Figure 1. Blood Lead Levels in micrograms per deciliter ($\mu\text{g/dL}$), by age group and sex

Age (Years)	Sex	Blood Lead Level ($\mu\text{g/dL}$)
2	Female	<1
7	Female	<1
10	Male	<1
11	Female	<1
12	Female	<1
16	Male	<1
46	Female	<1
48	Female	<1
55	Female	<1
62	Female	<1
65	Male	<1
67	Female	<1
67	Female	<1
69	Male	<1
71	Female	<1
1	Male	1
5	Male	1
6	Female	1
44	Male	1
47	Male	1
74	Male	2
8	Female	3
70	Male	5

Table 2. Age and sex of participants tested for urine arsenic level

Age (years)	Sex
5	Male
6	Female
6	Male
8	Male
8	Female
8	Female
11	Female
12	Female
16	Male
27	Female
44	Male
46	Female
47	Male
48	Female
48	Female
50	Male
55	Female
62	Female
65	Male
67	Female
67	Female
69	Male
70	Male
71	Female
74	Male

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ATTACHMENT A

Consent Form for Participation Walkerville, Montana, Exposure Investigation

(Note to person administering the consent form: Please cross out the test {blood/urine} that is not being done, and the address form {you/your child} that is not applicable, before reading the form. If only blood, or only urine, is being collected, read only the relevant sections of the form)

The Agency for Toxic Substances and Disease Registry (ATSDR) is conducting an investigation of possible excessive exposure to lead and inorganic arsenic among selected residents of Walkerville, MT., who live at properties with increased indoor dust lead and/or arsenic levels. A blood test for lead level and/or a urine sample for inorganic arsenic, methylarsonic acid (MMA), and dimethylarsinic acid (DMA) will be collected from you/your child. Some other, routine, urine tests namely, specific gravity and urine creatinine level, will also be done to better interpret the results. Your participation will help to determine if you/your child have increased exposure to lead and/or inorganic arsenic.

Procedure

We will give you an appointment for having your/your child's blood drawn from a vein, and/or, give you instructions and a collection kit for obtaining a urine sample in the privacy of your home. In addition to testing, we will give you a short list of some basic questions about yourself/your child that will help us interpret your/your child's test results better.

Risks and Benefits

The tests that we described earlier, have been used many times in the past. Although it maybe a bit painful to have the blood drawn (you/your child will feel the needle stick), and uncomfortable to give a urine sample, there are no known risks from these tests. Taking part in this investigation is voluntary and you/your child may choose to stop at any time even after signing this consent form. If you or your child choose not to participate, or stop at any time, there will be no penalty. Neither you nor your child will lose any benefits if you decide not to continue. If injury should occur as a result of being in this study ATSDR has made no provision to pay for medical treatment or other damages that may result.

A benefit of being in this testing is that you/ your child will get free tests to check if you/your child are getting exposed to levels of lead and arsenic that may cause health problems.

Privacy

All answers you give, and your/your child's test results, will be kept private to the extent permitted by law. Individual test results will not be made available to the public, but may be shared with other federal, state, or local health or environmental agencies if authorized by you, in order to provide appropriate follow-up actions.

Results

ATSDR will provide you with your/your child's individual test results and an explanation of their significance. If results show a high level of lead or arsenic, you may be contacted by Butte Silver Bow County Health Department, ATSDR and/or EPA to obtain additional information to find out your sources of exposure and ways to lower exposure in the future.

If you have any questions about this investigation or testing, please contact:

Dr. Rubina Imtiaz at 1-888-42-ATSDR (toll free), ext. 4764. Please leave your name, phone number and your question and your call will be returned.

Participant Consent

I have read the description of the exposure investigation. All of my questions have been answered to my satisfaction. I voluntarily request that I/my child be included in this investigation.

Participant Name (print): _____

Signature: _____

Address: _____

Phone: _____ Age: _____ Date: _____

Parent/Guardian's Signature (Print name): _____

Witness (print): _____

Witness (signature): _____

My test results may be shared with other Federal, state, or local public health or environmental agencies so that they can conduct follow-up activities if necessary.

Signature: _____

Thank you for your cooperation ,

**Assent Form for Children
(7-18 years old)**

This statement is to be read to the child participant in the presence of the parent/guardian:

"We want to find out if you have a chemical called lead and another one called arsenic in your body. Lead and arsenic were found in the dust inside your house. You cannot see these chemicals but they can make you sick. To see if you have lead in your body, we would like to take a sample of your blood. To see if you have arsenic in your body, we would like to take a sample of your urine. The urine sample can be collected by peeing in a test cup when you first go to the bathroom. Nothing bad will happen to you if you decide to not give your urine or blood sample."

"Do you have any questions? Would you like to give us your blood/urine sample?"

The above information has been read to me, and I want to take part in the blood/urine testing:

Name of Child: _____ Age: _____

Signature of Child: _____

Name of Parent or Legal Guardian: _____

Signature Parent/Guardian: _____ Date: _____

Child's Home Address: _____

Telephone number: _____

Witness (print): _____

Witness (signature): _____

Test results may be shared with other Federal, state, or local public health or environmental agencies so that they can work to prevent further exposure to me, if necessary.

Signature of parent/guardian : _____

Thank you

ATTACHMENT C
Walkerville Exposure Investigation - Urine Collection Instructions

Urine Collection Kits (*parents please assist younger children in collecting the urine properly*)

Each person submitting a urine sample will be supplied with a sample kit in a resealable plastic bag. The kit will contain:

- a plastic cup for collecting urine
- a plastic bottle with lid which will be used to send the urine sample to the laboratory. The bottle will be labeled with your name and an identifying number when you receive it.
- absorbent material

Urine Collection Instructions

- The urine sample should be collected from the first morning urination after waking up. If this is not possible, the sample can be collected at some other time during the day.
- We suggest placing the plastic bag containing the urine collection supplies in your bathroom the night before collection. Do not open the bag until you are ready to collect the urine sample.
- Be sure to wash your hands with soap and water before urinating. Rinse hands well and dry with a clean towel.
- Do not open the plastic bottle until you are ready to collect your sample. When you unscrew the lid from the plastic bottle, place it top-side down (i.e., rim up) on a clean surface. Handle the lid by the outer edges only. Do not touch the part of the lid that may come in contact with urine after it is resealed.
- The urine sample can be collected by urinating into the plastic bottle or into the supplied plastic cup. If using the cup, immediately transfer the contents of the cup to the plastic bottle. With either method, fill the plastic bottle 1/4 to 1/2 full. The plastic cup can be thrown away once you have transferred the contents to the plastic bottle. Do not use the plastic cup for more than one sample collection.
- Screw the bottle cap on tightly immediately after collection and wipe any excess urine from the outside of the bottle with a clean paper towel.
- Place the bottle in the plastic zip-lock bag and reseal. Place the bag in the refrigerator until you are ready to return it.
- When you return the plastic bottle, we will seal it with custody tape which you will be required to initial. The plastic bottle will be sent by overnight mail to the testing laboratory. The laboratory will not test the specimen if the custody tape is not present or is broken.

ATTACHMENT D

INDIVIDUAL QUESTIONNAIRE FOR URINE COLLECTION

Site: Walkerville, 2001

Name of person giving urine sample: _____

Date and time urine sample given (urine voided): _____

Name of Person filling out the questionnaire (Parents/guardians to fill this out for the child who has passed the urine sample): _____

Please answer the following questions for you/your child, for the 3 day period just before passing the urine sample. This will help us interpret the results of your/your child's urine test better.

Qs.1 Did you/your child, eat or drink any of the following foods during the three days before giving urine for testing? (circle the correct answers)

seafood (fish, shrimp, etc.) YES NO

rice YES NO

Red Wine YES NO

Qs.2 These questions are about your child whose urine is being tested:

In the last three days,

a) Did your child eat dirt? YES NO

b) Did your child play in the dirt outside the house? YES NO

Qs.3 In the last 3 days how many hours did you/your child spend outside your home?

Hours _____ Date _____

Thank you.